

WestFest

SCIENCE & SUSTAINABILITY

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Light Science and Kaleidoscopes

A kaleidoscope is a device that creates beautiful patterns. It's like having a tiny world of shapes and colors inside a tube! It works by using mirrors and reflection. When you look through one end and turn or shake the tube, the mirrors inside reflect the light and repeats its reflection of whatever you're looking at. It's like a never-ending play of colors and shapes, making it a fascinating toy for exploring the wonders of light and reflection!

Materials:

Container of 30 beads	1 ornament ball (2 halves)	tape (not included)
1 sheet mirror board	1 sheet origami paper	
1 cardboard tube	1 glue stick	

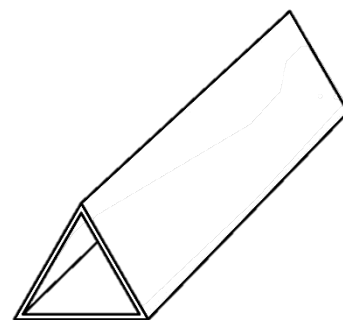
Building the Kaleidoscope

Assembling the Object Chamber (what we want to see)

1. Remove the beads from the container and place in half of an ornament ball
2. Close the ornament ball with the other half
 - a. (optional) secure the ornament ball with a piece of tape
3. Push the ornament ball into one side of the cardboard tube opening so it fits snugly

Assembling the Reflection Tube

4. Fold the mirror board (lengthwise) into thirds with the mirror (reflective side) facing in
 - a. Mirror boards are 5 inches by 4 inches; once folded, each section should be roughly 5 inches by 1.3 inches
5. Make a triangular tube (mirror board should face inside the tube) by bringing the long edges together



- a. (optional) secure the tube with a piece of tape on the outside of tube
6. Slide the triangular tube into the cardboard tube on the opposite end of the ornament ball

Decorating the Kaleidoscope

1. Glue down the sheet of origami paper around the cardboard tube
2. OR decorate the cardboard tube as desired

Viewing through the Kaleidoscope

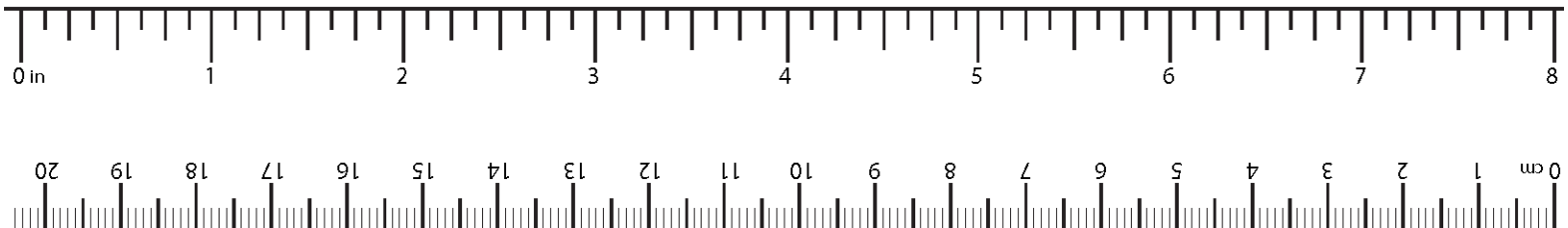
1. Look through the cardboard tube where the mirror board is flush with the opening (opposite end of the ornament ball)
2. Notice the reflections being made on the mirror boards by the beads
3. Rotate or shake the cardboard tube so that the beads shift and move

Additional Challenges

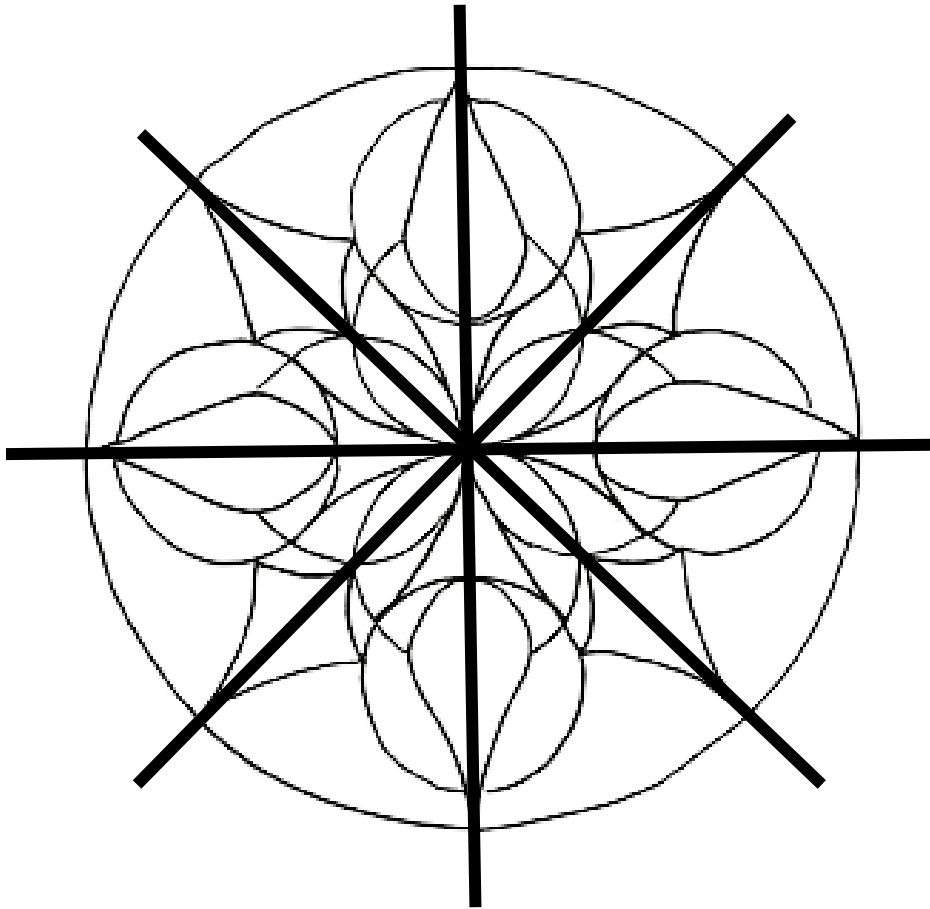
1. Replace the beads with other colorful items found around your house (yarn, buttons, etc.)
2. Change the light source by looking into a window, a lamp, a dark room
3. Fold one of the sections of the mirror back so that only two of the three mirror sections are visible when viewing the beads

Questions for Curious Minds

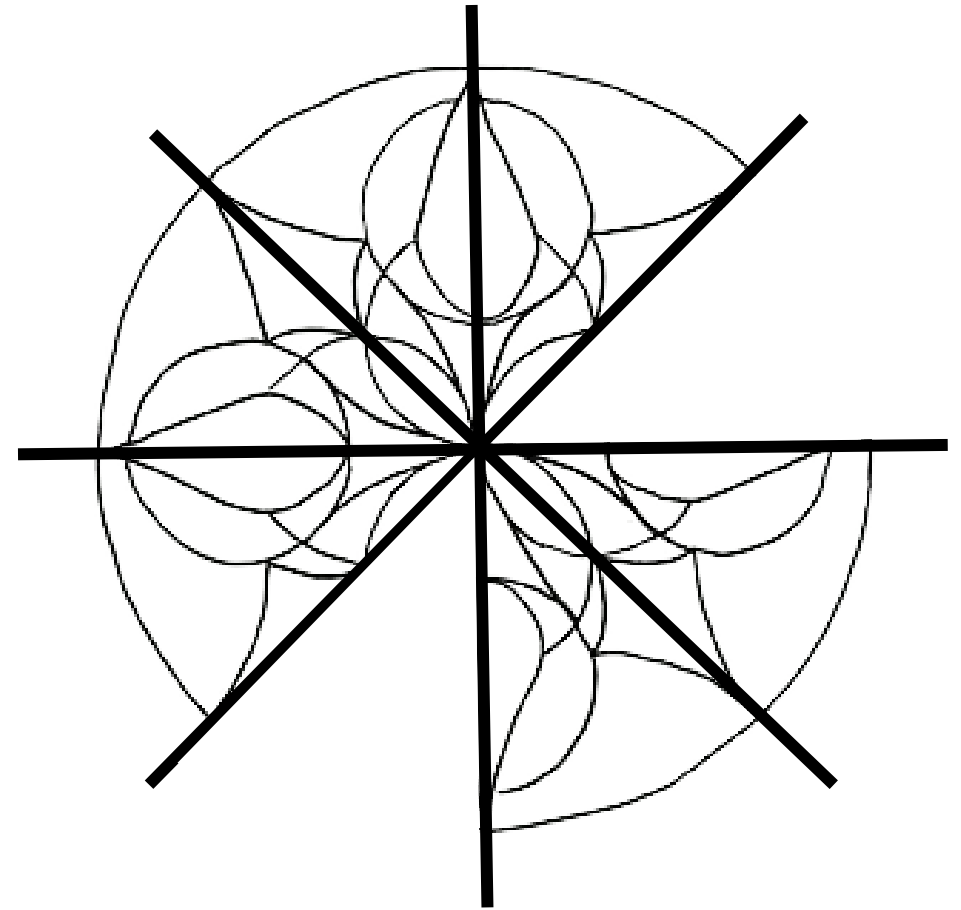
1. What would happen if there's no mirror inside the cardboard tube?
2. Is light important in creating the images/pattern inside the kaleidoscope? Why?
3. Why do patterns inside a kaleidoscope look symmetrical (repeat itself)?
4. How does turning/shaking the kaleidoscope tube change the patterns and colors you see?
5. Can you think of any other objects or situations where mirrors and reflection are important?



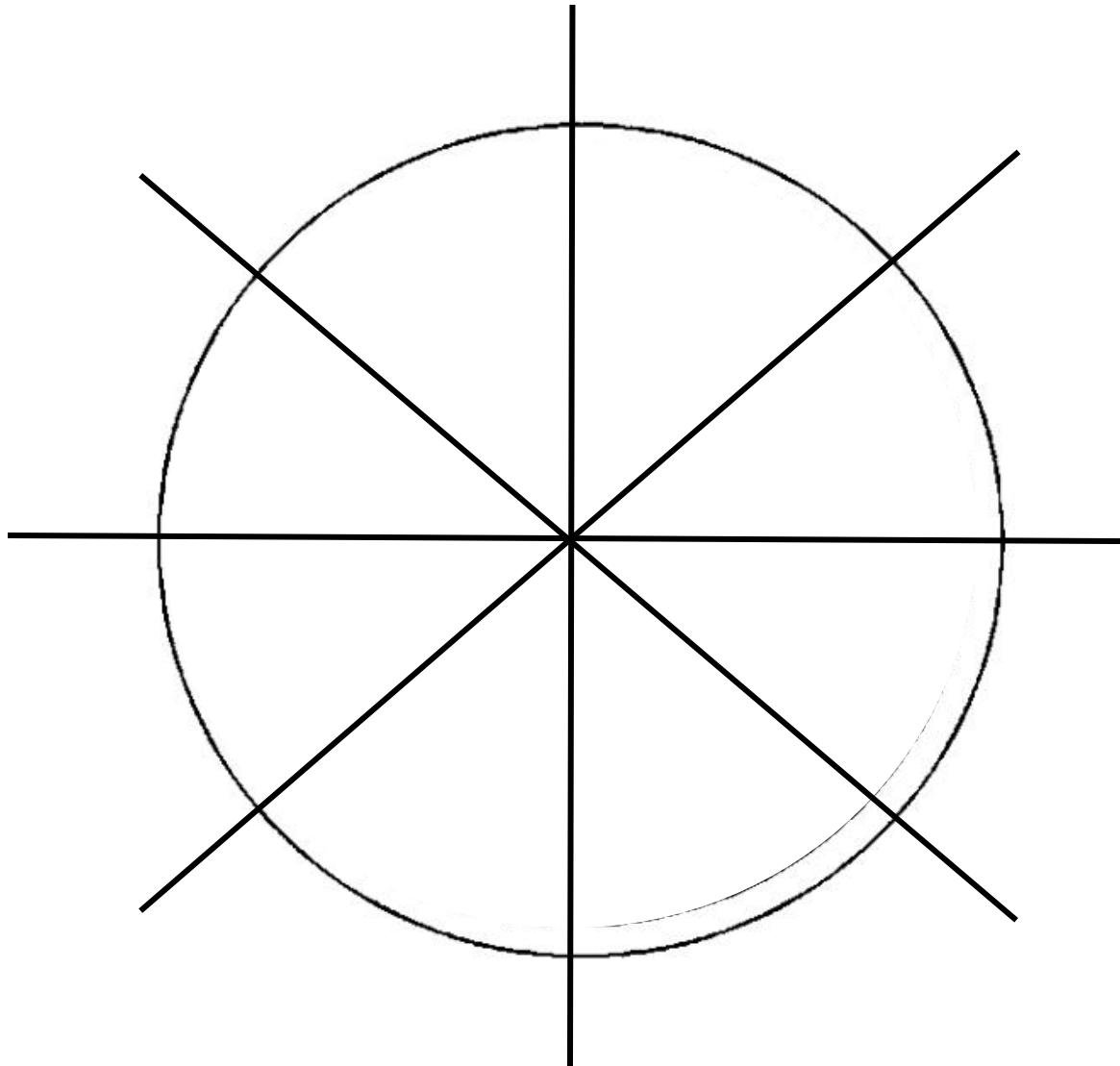
Let's Make Mandalas!



Mandalas have symmetry around their center point. This mandala has been divided into eight equal triangles. Use what you have learned about reflections to color the mandala. *Hint:* A shape should be the same color in every triangle.



Now that you know how to color a mandala, let's see if you can draw the missing patterns! Use the mandala to reflect the pattern into the two missing triangles! *Hint:* The triangles you draw should match the mandala you colored.



Now it's time to create and color your own mandala! Use the shapes below to create a pattern that will be reflected in each triangle of the mandala above. Remember, each of your sections should be reflected around the center point.

